

Adjustment DE-A regarding NO_x from Road Vehicles

PREFACE

When deriving proposals for national emission ceilings for negotiations of the 1999 Gothenburg Protocol, sector-specific emission estimates for the year 2010 were calculated at IIASA using a set of scenarios which assumed various technological abatement measures, policy incentives, and legislation available / in place or planned at that time. As a result, the 2010 emission by road transport in Germany was estimated at NO_x (IIASA, 1999) ¹⁾. The over-all 2010 national emission ceiling (NEC) for NO_x was set to 1,081 kt. When negotiating the EU NEC Directive two years later, Germany agreed to reduce its NO_x emissions further, resulting in a NEC of 1,051 kt.

In its 2016 NEC emissions reporting, Germany provided a national total for NO_x emissions of 1,337 kt for 2010. However, this total includes emissions from agricultural soils and other source categories not accounted for when setting the NEC. In addition, some assumptions made in 1999, including on emission factors from road traffic, turned out to be wrong in reality. Like in many other European countries, non-compliance with the 2010 NEC as set in 1999 was partly not caused by failed national mitigation policies, but by changes beyond the control of, and unforeseen by, the individual Party or Member State.

In order to differentiate such changes from policy failures in the responsibility of the individual Parties to the Gothenburg Protocol, a procedure (Inventory Adjustment) allowing the adjustment of emissions resulting from new emission categories, changes in estimation methodologies, emission factors etc. provided within the EMEP/EEA Guidebook, or other effects beyond national control with respect to complying to emission reduction obligations (EB, 2012 a & c) ^{2), 3)} was agreed. This procedure is applicable also for existing NECs (EB, 2012b) ⁴⁾.

With respect to road transport, such an unforeseeable effect was the partial failure of several so-called “Euro norms” set on the EU level to reduce emissions from road vehicles. In this report, Germany presents an estimate of the NO_x emissions resulting from the partial failure of the mitigation policy reflected by the Euro norms, and lays out the calculations leading to these estimates.

REASONS FOR MISSING THE GOTHENBURG CEILINGS

The TREMOD methodology applied for estimating emissions from road transportation in Germany has changed over time. These changes include updates of emission factors (EF) for various pollutants and other changes such as an extension of vehicle classification (and thus inclusion of emission factors associated with these new vehicle sub-categories) to improve the estimation's accuracy.

The main changes occurred for the emission factors and for the Heavy Duty Vehicles (HDV) fleet structure. This last point led to changes in emissions because of the reallocation of activities (consumption/traffic) between the sub-categories of vehicles.

For the formalism of the adjustments, it is difficult to flag whether the modifications for road transport are due to “methodological changes” or due to “changes of emission factor”. Therefore, only the term “change of methodology” will be used (even if at the NFR reporting level this may seem like a simple change in EFs).

So far as road transport is concerned, the inability to attain the emission ceiling is most likely to have been affected by a combination of technological changes within the fleet (which of course made their way into the several versions of TREMOD) combined with greater than originally expected dieselisation of the fleet.

ANALYSING THE PROBLEM: THE EUROPEAN PERSPECTIVE BASED ON COPERT

Already in 2011, these effects were demonstrated by Ntziachristos and Papageorgiou (2011) ⁵⁾. Here, the impacts of changing model versions and activity data in the context of meeting the EU NEC Directive ceiling commitments were examined for four European countries including Germany. Unfortunately, this comparison study was carried out within a COPERT environment. Therefore, the results gained cannot be transferred to the German TREMOD environment on a one-to-one level but nonetheless allow a highly illustrative insight in the reasons for not meeting the set ceiling. The study modeled fuel consumption and NO_x emissions for four selected countries (Germany, France, Netherlands and Belgium) and found higher NO_x emissions were estimated for the road transport sector than originally modelled by the RAINS model of IIASA (which underpinned the setting of 2010 ceilings). For Germany, this study shows that with the same activity data set (LIFE+

EC4MACS data from Amann et al. (2010)), NO_x emissions estimated with COPERT II vs. COPERT 4 (v8.0) increase from 410 kt to 518 kt due to methodological changes, a difference of 282 kt. An additional consideration of changes in AD would lead to 620 kt of NO_x. However, as changes in AD are no valid adjustment reason, the latter value is for information only.

This was mainly due to: * NO_x “artificial” current emissions = virtual current emissions assuming no changes in emission factors emission factors updated in COPERT 4 that did not follow the reductions as set by the emission standards for diesel passenger cars; * important part of diesel fuel consumption in the total fuel consumption of the road traffic.

The results of this study showed that it is the combination of different parameters which might affect the ability (to different extents) of a Party to attain the emission ceilings. In other words, the exceeding of NO_x ceilings for road transport is due to:

Changes in methodology and emission factors

As these technologically driven changes (as reflected in the evolution of the different so-called Euro norms) lie outside the country's responsibility, current methodology and EFs have to be adjusted in a way to allow the comparison of the actual inventory and the Gothenburg ceilings.

Changes in the activity data

As the development of mileage driven and fuels used within a country (Germany: stronger dieselisation then originally expected) is of the country's responsibility, this effect has to be excluded from any adjustment estimation.

IN-COUNTRY ANALYSIS: THE TREMOD PERSPECTIVE

INITIAL ASSUMPTION

In order to estimate the effect of NO_x emissions resulting from the failure of the so-called Euro norms, the following procedure has been agreed by expert review teams in the last two years:



proposed amount of adjustable emissions = current AD x current EF - current AD x original EF = current AD x (current EF - original EF)
= current EM - “artificial” current EM¹

¹ “artificial” current emissions = virtual current emissions assuming no changes in emission factors



$$\begin{aligned} EM_{\text{adjustment}} &= AD_{\text{current}} * EF_{\text{current}} - AD_{\text{current}} * EF_{\text{original}} \\ &= AD_{\text{current}} * (EF_{\text{current}} - EF_{\text{original}}) \\ &= EM_{\text{current}} - EM_{\text{current "artificial"}} \end{aligned}$$

with

- **EM „adjustment,,** = amount of emissions to be subtracted from National Totals
- **AD „current,,** = AD from latest TREMOD version as used for current submission
- **EF „current,,** = EF from latest TREMOD version as used for current submission
- **EF „original,,** = EF from TREMOD version used at the time NEC ceilings were set (here: TREMOD 3.1)
- **EM „current,,** = EM estimated from AD and EF from latest TREMOD version = EM reported for NFR 1.A.3.b with latest submission
- **EM „current-“artificial”,,** = EM estimated from AD from latest TREMOD version and EF from TREMOD version used at the time NEC ceilings were set (here: TREMOD 3.1)

APPLYING THE ORIGINAL METHODOLOGY

FRAMEWORK INFORMATION

The methodology used for estimating Germany's exhaust emissions from road transport when determining emissions ceilings of the Gothenburg Protocol (1999), was the second version of the EMEP/CORINAIR guidebook corresponding to COPERT II software. This method proposed NO_x emission factors for

- passenger cars (PC): up to Euro 1
- light commercial vehicles (LCV2): up to Euro 1
- heavy duty vehicles (HDV): pre-EURO I only (conventional)

Back then, without better knowledge, the emission factors for the most recent standards were derived by directly applying the expected reductions in emission standards.

However, as Germany does not use COPERT for compiling its road transport emissions inventory but a national model called TREMOD, the following comparison has to be carried out between the oldest version of TREMOD still available and the version as applied for the current inventory submission (2021).

Unfortunately, the oldest TREMOD version available for such comparison is TREMOD 3.1 from 2002 ⁶⁾, including the following set of NO_x emission factors:

- passenger cars (PC): up to Euro 4
- light commercial vehicles (LCV): up to Euro 4
- heavy duty vehicles (HDV) only up to EURO V

However, as this version includes the technological development since 1999 (when the ceilings were set based on COPERT II), the results from this analysis and the adjustment proposal based upon these results are likely to slightly underestimate the effect of technological changes since 1999 and must therefore be considered conservative.

THE COMPARISON

Application of the original NO_x methodology to the current road transport background activity data

The *basic activity data* (such as over-all fuel sold and traffic mileages by vehicle type, by fuel or by Euro regulation) implemented in TREMOD 3.1 differ significantly from those of the current TREMOD version especially for the more recent years as of 2005. In addition, *specific activity data* (such as fuel consumptions per vehicle type, per fuel or per Euro regulation) strongly depend on the TREMOD version.

Within this report, Germany re-estimates the NO_x emission within the TREMOD 3.1 model. To isolate the requested information, the original TREMOD 3.1 activity data was combined with emission factors from both TREMOD 3.1 and the currently used TREMOD 6.12 (Knörr et al., 2020a) ⁷⁾.

Description of the updated methodology used

The updated methodology, used in 2019 (for NFR submission 2021) and implemented in version 6.12 of the TREMOD software, considers emission factors of

- passenger cars (PC) up to Euro 6d
- light commercial vehicles (LCV) up to Euro 6d
- heavy duty vehicles (HDV) up to EURO VI

and

- motorized two-wheelers (M2W) up to Euro 4

Comparison of emission estimates made using the original and updated methodologies

The values of NO_x emissions presented in the table below are estimated with:

- TREMOD 3.1 model equations as initial methodology

and ,

- TREMOD 6.12 equations as methodology applied for NEC submission 2021.

The activity data applied to initial (here: oldest available) and most recent methodology, are those of the latest inventory provided with NEC submission 2021.

Table 1: Resulting adjustment proposal 2020

for year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
proposed adjustment	-296.1	-300.7	-300.4	-305.2	-294.9	-274.9	-250.9	-221.1	-179.6	-144.8

The following screenshots show the TREMOD 3.1 / TREMOD 6.12 implementation comparisons per vehicle type/fuel/Euro regulation.

Activity Data

- **current:** from TREMOD 6.12, as reported with the latest inventory submission
- **adjusted:** has to be similar to **current** AD!
- **difference:** as only recent AD are to be used for adjustment estimations, this value must be zero!

Implied Emission Factor

- **current:** representing the ratio of current emissions and current AD
- **adjusted:** representing the ratio of adjusted emissions and current AD
- **difference:** shows percentual difference

NO_x Emissions

- **current:** from TREMOD 6.12, as reported with the latest inventory submission
- **adjusted:** estimated based on TREMOD 3.1 methodology and TREMOD 6.12 AD
- **adjustment:** adjusted emissions minus current emissions
- **difference:** percentual difference between current and adjusted emissions

Adjustment overview for years 2010 to 2019

NFR Code	Fuel	Year	Activity Data			Implied Emission Factor			NO _x Emissions			
			current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference
			in [TJ]		in [%]	in [kg/TJ]		in [%]	in [kg]			in [%]
1.A.3.b.i	gasoline		795.957	795.957	0%	97.55	84.99	-13%	77.64.842	67.690.906	9.993.935	-13%
1.A.3.b.i	diesel oil		629.380	629.380	0%	429.45	160.51	-63%	227.341.096	84.970.461	142.370.635	-63%
1.A.3.b.ii	gasoline		6.325	6.325	0%	255.87	214.75	-16%	1.618.432	1.358.328	260.104	-16%
1.A.3.b.ii	diesel oil		113.450	113.450	0%	476.34	134.96	-72%	54.040.533	15.311.584	38.728.949	-72%
1.A.3.b.iii	gasoline		48.844	48.844	0%	823.00	482.55	-42%	29.931.266	23.183.732	6.747.534	-23%
1.A.3.b.iii	diesel oil		566.741	566.741	0%	446.67	271.83	-39%	253.148.243	154.056.160	99.092.083	-39%
1.A.3.b.iv	gasoline		19.712	19.712	0%	113.68	168.43	48%	2.240.749	3.320.034	-1.079.285	48%
1.A.3.b TOTAL	2010		2.079.608	2.079.608	0%			0%	645.965.162	349.851.206	296.113.956	-46%
1.A.3.b.i	gasoline		794.688	794.688	0%	92.09	81.61	-11%	73.185.851	64.851.951	8.333.900	-11%
1.A.3.b.i	diesel oil		553.564	553.564	0%	434.12	159.22	-63%	240.313.791	88.138.959	152.174.832	-63%
1.A.3.b.ii	gasoline		6.118	6.118	0%	229.35	198.57	-13%	1.403.081	1.214.776	188.305	-13%
1.A.3.b.ii	diesel oil		115.967	115.967	0%	481.55	126.92	-74%	55.844.518	14.718.142	41.126.376	-74%
1.A.3.b.iii	gasoline		47.355	47.355	0%	592.65	448.99	-24%	28.071.221	21.268.323	6.804.898	-24%
1.A.3.b.iii	diesel oil		563.891	563.891	0%	410.38	244.97	-40%	231.410.271	138.135.342	93.273.929	-40%
1.A.3.b.iv	gasoline		19.289	19.289	0%	110.79	171.60	54%	2.137.002	3.299.162	-1.162.160	54%
1.A.3.b TOTAL	2011		2.106.883	2.106.883	0%			0%	632.365.736	331.625.655	300.740.081	-48%
1.A.3.b.i	gasoline		750.957	750.957	0%	85.73	78.00	-9%	64.379.994	58.677.229	5.802.765	-9%
1.A.3.b.i	diesel oil		555.245	555.245	0%	435.96	158.66	-64%	242.062.902	88.096.699	153.966.203	-64%
1.A.3.b.ii	gasoline		5.657	5.657	0%	218.93	193.15	-12%	1.238.520	1.092.662	145.859	-12%
1.A.3.b.ii	diesel oil		114.350	114.350	0%	481.91	128.17	-75%	55.106.362	13.741.354	41.365.008	-75%
1.A.3.b.iii	gasoline		50.902	50.902	0%	533.22	384.33	-28%	27.141.913	19.563.200	7.578.704	-28%
1.A.3.b.iii	diesel oil		589.585	589.585	0%	381.33	224.00	-41%	234.829.180	132.064.753	102.764.428	-41%
1.A.3.b.iv	gasoline		18.268	18.268	0%	107.43	173.28	61%	1.962.546	3.165.439	-1.202.893	61%
1.A.3.b TOTAL	2012		2.084.964	2.084.964	0%			0%	616.721.438	316.391.343	300.429.094	-49%
1.A.3.b.i	gasoline		749.114	749.114	0%	89.35	74.85	-7%	60.190.007	56.071.797	4.118.211	-7%
1.A.3.b.i	diesel oil		589.131	589.131	0%	437.14	158.71	-64%	257.633.728	93.499.010	164.134.718	-64%
1.A.3.b.ii	gasoline		5.578	5.578	0%	202.80	184.07	-9%	1.131.209	1.026.727	104.482	-9%
1.A.3.b.ii	diesel oil		118.777	118.777	0%	480.60	114.93	-76%	57.083.533	13.690.488	43.433.045	-76%
1.A.3.b.iii	gasoline		51.716	51.716	0%	509.64	368.06	-29%	26.350.969	18.620.843	7.730.126	-29%
1.A.3.b.iii	diesel oil		600.139	600.139	0%	353.06	287.93	-19%	211.887.531	124.788.469	87.099.062	-41%
1.A.3.b.iv	gasoline		18.229	18.229	0%	104.34	175.38	68%	1.902.688	3.197.038	-1.294.351	68%
1.A.3.b TOTAL	2013		2.132.683	2.132.683	0%			0%	616.079.063	316.854.371	300.224.692	-50%
1.A.3.b.i	gasoline		752.526	752.526	0%	76.03	73.09	-4%	57.215.533	54.988.921	2.216.612	-4%
1.A.3.b.i	diesel oil		626.845	626.845	0%	435.87	159.12	-63%	272.876.061	95.613.892	177.262.169	-63%
1.A.3.b.ii	gasoline		5.845	5.845	0%	190.34	176.49	-7%	1.112.584	1.031.612	80.972	-7%
1.A.3.b.ii	diesel oil		128.578	128.578	0%	475.56	110.96	-77%	61.146.575	14.267.237	46.879.338	-77%
1.A.3.b.iii	gasoline		49.143	49.143	0%	468.37	339.99	-27%	23.017.115	16.708.234	6.308.881	-27%
1.A.3.b.iii	diesel oil		572.754	572.754	0%	314.05	196.05	-38%	179.874.133	112.285.582	67.588.551	-38%
1.A.3.b.iv	gasoline		18.673	18.673	0%	100.59	179.24	78%	1.878.294	3.345.794	-1.467.499	78%
1.A.3.b TOTAL	2014		2.153.563	2.153.563	0%			0%	597.120.297	302.252.271	294.868.025	-49%
1.A.3.b.i	gasoline		715.156	715.156	0%	74.38	71.73	-4%	53.190.787	51.300.983	1.889.805	-4%
1.A.3.b.i	diesel oil		645.555	645.555	0%	426.19	159.80	-63%	275.130.233	103.163.501	171.966.732	-63%
1.A.3.b.ii	gasoline		5.793	5.793	0%	187.12	172.80	-8%	1.083.927	1.000.999	82.928	-8%
1.A.3.b.ii	diesel oil		135.386	135.386	0%	489.35	187.96	-77%	63.605.443	14.607.490	48.997.953	-77%
1.A.3.b.iii	gasoline		52.287	52.287	0%	458.96	327.99	-29%	23.997.817	17.149.448	6.848.370	-29%
1.A.3.b.iii	diesel oil		589.411	589.411	0%	266.69	187.51	-30%	157.189.675	110.620.703	46.568.973	-30%
1.A.3.b.iv	gasoline		18.459	18.459	0%	99.32	189.65	82%	1.833.362	3.334.472	-1.501.090	82%
1.A.3.b TOTAL	2015		2.161.376	2.161.376	0%			0%	575.931.265	301.877.596	274.053.670	-48%
1.A.3.b.i	gasoline		715.272	715.272	0%	79.93	76.65	-4%	50.736.367	50.535.049	201.318	0%
1.A.3.b.i	diesel oil		675.119	675.119	0%	410.36	160.76	-61%	277.041.660	108.535.230	168.506.430	-61%
1.A.3.b.ii	gasoline		5.926	5.926	0%	180.27	171.05	-5%	1.068.292	1.013.678	54.614	-5%
1.A.3.b.ii	diesel oil		144.068	144.068	0%	456.12	185.62	-77%	65.712.732	15.216.007	50.496.725	-77%
1.A.3.b.iii	gasoline		54.157	54.157	0%	424.73	388.24	-7%	23.002.109	16.683.117	6.308.992	-27%
1.A.3.b.iii	diesel oil		594.013	594.013	0%	226.31	180.97	-20%	134.431.699	107.496.262	26.935.437	-20%
1.A.3.b.iv	gasoline		18.785	18.785	0%	95.14	181.66	89%	1.805.897	3.412.476	-1.606.579	89%
1.A.3.b TOTAL	2016		2.207.339	2.207.339	0%			0%	553.790.558	302.901.820	250.897.738	-45%
1.A.3.b.i	gasoline		724.571	724.571	0%	67.66	69.88	3%	49.026.074	50.634.714	-1.607.640	3%
1.A.3.b.i	diesel oil		696.592	696.592	0%	390.65	161.95	-59%	272.126.091	112.810.721	159.315.370	-59%
1.A.3.b.ii	gasoline		6.186	6.186	0%	171.15	167.18	-2%	1.058.799	1.034.211	24.588	-2%
1.A.3.b.ii	diesel oil		153.284	153.284	0%	424.66	183.89	-76%	65.093.930	15.925.216	49.168.714	-76%
1.A.3.b.iii	gasoline		53.382	53.382	0%	379.80	286.71	-23%	19.793.901	15.304.828	4.489.073	-23%
1.A.3.b.iii	diesel oil		596.263	596.263	0%	195.02	175.92	-10%	116.671.141	106.246.508	11.424.633	-10%
1.A.3.b.iv	gasoline		19.160	19.160	0%	92.83	183.39	98%	1.778.674	3.513.787	-1.735.114	98%
1.A.3.b TOTAL	2017		2.251.437	2.251.437	0%			0%	525.549.410	304.469.986	221.079.424	-42%
1.A.3.b.i	gasoline		699.027	699.027	0%	64.42	68.36	6%	45.032.996	47.786.817	-2.753.820	6%
1.A.3.b.i	diesel oil		666.074	666.074	0%	371.66	163.30	-56%	247.556.063	108.768.604	138.787.459	-56%
1.A.3.b.ii	gasoline		6.315	6.315	0%	158.22	160.11	1%	999.199	1.011.138	-11.939	1%
1.A.3.b.ii	diesel oil		154.259	154.259	0%	384.71	182.69	-73%	59.344.525	15.840.310	43.504.215	-73%
1.A.3.b.iii	gasoline		51.634	51.634	0%	309.75	263.53	-15%	15.993.526	13.607.106	2.386.420	-15%
1.A.3.b.iii	diesel oil		585.186	585.186	0%	171.18	172.10	1%	180.173.337	180.710.869	-537.532	1%
1.A.3.b.iv	gasoline		18.497	18.497	0%	89.66	184.61	106%	1.658.588	3.414.767	-1.756.209	106%
1.A.3.b TOTAL	2018		2.180.993	2.180.993	0%			0%	478.758.206	291.139.612	179.618.593	-38%
1.A.3.b.i	gasoline		704.691	704.691	0%	62.30	68.45	10%	43.901.941	48.238.025	-4.336.084	10%
1.A.3.b.i	diesel oil		663.841	663.841	0%	345.81	165.07	-52%	229.566.088	109.582.982	119.983.106	-52%
1.A.3.b.ii	gasoline		6.683	6.683	0%	146.08	153.25	5%	976.219	1.034.150	-57.931	5%
1.A.3.b.ii	diesel oil		159.183	159.183	0%	347.42	181.90	-71%	55.303.535	16.221.445	39.082.090	-71%
1.A.3.b.iii	gasoline		52.939	52.939	0%	274.41	247.81	-10%	14.527.012	13.118.578	1.408.434	-10%
1.A.3.b.iii	diesel oil		595.913	595.913	0%	153.35	169.17	10%	91.380.760	106.809.376	-15.428.616	10%
1.A.3.b.iv	gasoline		18.750	18.750	0%	86.05	186.83	117%	1.613.450	3.502.941	-1.889.491	117%
1.A.3.b TOTAL	2019		2.202.899	2.202.899	0%			0%	437.268.744	292.497.697	144.771.048	-33%

Adjustment details for 2020

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference	
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [kg]	
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13,686	13,686	0%	584.75	514.25	-12%	7,955,060	6,996,917	-958,143	-12%
		Car 1	36,541	36,541	0%	338.50	297.71	-10%	25,915,925	19,189,262	-7,716,663	-30%
		Car 2	96,425	96,425	0%	172.95	135.63	-22%	16,580,020	13,020,026	-3,559,994	-22%
		Car 3	133,139	133,139	0%	58.51	70.18	20%	7,790,384	9,343,433	1,553,029	20%
		Car 4	444,991	444,991	0%	42.27	42.19	0%	18,911,389	18,773,529	-137,859	0%
		Car 5	31,234	31,234	0%	18.61	42.19	127%	581,142	1,317,737	736,595	127%
	Car 6	0	0	0%	25.08	42.19	62%	2	3	1	62%	
	Gasoline total	795,957	795,957	0%	92.55	84.39	-9%	77,646,642	67,656,596	-9,990,045	-13%	
	Diesel Oil	pre-Cars	1,915	1,915	0%	318.13	264.95	-17%	583,760	527,256	-56,504	-10%
		Car 1	10,339	10,339	0%	294.42	245.17	-17%	3,044,428	2,741,387	-303,041	-10%
Car 2		50,088	50,088	0%	406.90	279.19	-31%	29,372,795	19,974,210	-9,398,584	-32%	
Car 3		134,025	134,025	0%	542.54	170.54	-69%	72,645,173	23,929,276	-48,715,897	-67%	
Car 4		279,154	279,154	0%	304.37	140.58	-53%	167,299,180	39,243,811	-128,055,369	-77%	
Car 5		53,547	53,547	0%	434.70	140.58	-68%	23,276,735	7,527,796	-15,748,939	-68%	
Car 6	334	334	0%	257.62	140.58	-45%	85,044	46,553	-38,491	-45%		
Diesel oil total	529,380	529,380	0%	429.45	160.55	-63%	227,347,096	84,970,461	-142,376,635	-63%		
Pkx Total	1,325,337	1,325,337	0%	238.12	155.14	-36%	364,985,938	152,627,057	-212,358,881	-58%		
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	1,249	1,249	0%	627.99	640.95	10%	783,320	904,871	121,551	16%
		Car 1	367	367	0%	961.95	297.39	-69%	369,969	186,620	-183,349	-50%
		Car 2	1,393	1,393	0%	264.75	184.41	-30%	369,840	256,917	-112,923	-30%
		Car 3	856	856	0%	82.47	90.83	10%	70,631	77,625	6,994	10%
		Car 4	2,420	2,420	0%	36.32	44.90	24%	87,967	188,679	100,712	115%
		Car 5	49	49	0%	15.34	44.90	193%	750	2,218	1,468	193%
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
	Gasoline total	6,345	6,345	0%	255.87	254.75	-0%	1,478,832	1,596,126	117,294	8%	
	Diesel Oil	pre-Cars	4,876	4,876	0%	425.99	386.79	-9%	2,077,142	1,436,983	-640,159	-31%
		Car 1	9,989	9,989	0%	398.18	276.24	-31%	2,389,095	1,289,636	-1,099,459	-46%
Car 2		13,126	13,126	0%	336.76	153.18	-54%	4,420,260	2,534,731	-1,885,529	-43%	
Car 3		33,249	33,249	0%	531.91	150.58	-72%	17,655,883	5,086,760	-12,569,123	-72%	
Car 4		54,581	54,581	0%	491.42	80.69	-84%	26,021,036	4,940,722	-21,080,314	-81%	
Car 5		1,629	1,629	0%	427.50	80.69	-79%	696,296	144,434	-551,862	-79%	
Car 6	0	0	0%	151.73	80.69	-47%	7	4	-3	-43%		
Diesel oil total	113,450	113,450	0%	476.34	134.94	-72%	54,043,533	15,351,584	-38,691,949	-72%		
LDVs Total	119,775	119,775	0%	464.70	139.18	-70%	55,658,966	16,685,913	-38,973,053	-70%		
1.A.3.b.ii. Heavy Duty Vehicle Buses	Diesel Oil	pre-Cars	3,382	3,382	0%	1096.25	1028.78	-6%	3,674,067	3,432,644	-241,423	-7%
		Car 1	2,826	2,826	0%	749.41	732.14	-2%	2,117,871	2,125,595	7,723	0%
		Car 2	10,152	10,152	0%	801.96	643.47	-20%	8,140,119	6,532,213	-1,607,906	-20%
		Car 3	15,090	15,090	0%	633.22	437.25	-30%	10,865,776	7,289,299	-3,576,477	-33%
		Car 4	5,461	5,461	0%	448.63	351.65	-21%	2,650,016	1,921,527	-728,489	-28%
		Car 5	10,326	10,326	0%	327.28	182.33	-44%	3,882,417	1,882,644	-1,999,773	-51%
	Car 6	0	0	0%	0	0	0%	0	0	0	0%	
	Buses Total	48,044	48,044	0%	623.80	482.55	-23%	29,931,266	23,185,732	-6,745,534	-23%	
	Heavy Duty Trucks & Lorries	pre-Cars	10,185	10,185	0%	1040.16	787.37	-24%	10,510,623	7,754,136	-2,756,487	-26%
		Car 1	5,677	5,677	0%	758.59	575.55	-24%	4,261,383	3,267,681	-993,702	-23%
Car 2		38,558	38,558	0%	817.62	524.79	-36%	31,525,526	20,234,619	-11,290,907	-36%	
Car 3		169,023	169,023	0%	626.28	274.48	-56%	161,136,182	59,617,271	-101,518,911	-63%	
Car 4		69,636	69,636	0%	368.34	290.62	-21%	27,183,867	20,146,636	-7,037,231	-26%	
Car 5		283,934	283,934	0%	276.42	151.65	-45%	78,643,643	43,115,897	-35,527,746	-45%	
Car 6	0	0	0%	0	0	0%	0	0	0	0%		
Trucks Total	566,741	566,741	0%	446.67	271.83	-39%	293,148,243	154,696,160	-138,452,083	-48%		
1.A.3.b.iii. Motorized Two-Wheelers (M2Ws)	Gasoline	pre-Cars	7,973	7,973	0%	122.80	149.18	22%	972,721	1,189,353	216,632	22%
		Car 1	5,231	5,231	0%	123.77	165.74	34%	647,479	887,039	239,560	34%
		Car 2	3,587	3,587	0%	141.16	194.21	38%	585,362	696,661	111,299	19%
		Car 3	2,950	2,950	0%	38.11	184.21	381%	116,189	657,032	540,843	381%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
M2Ws Total	19,172	19,172	0%	113.68	168.43	48%	2,243,149	3,326,034	1,082,885	48%		
1.A.3.b. Road Transport	Total	2,879,688	2,879,688	0%	219.62	168.23	-46%	645,965,162	349,851,296	-296,113,866	-46%	

Adjustment details for 2021

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions					
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference		
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [kg]		
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	13,063	13,063	0%	592.96	534.69	-10%	7,720,235	6,979,435	-740,801	-10%	
		Car 1	61,979	61,979	0%	347.96	340.16	-31%	21,640,430	18,884,961	-2,755,469	-13%	
		Car 2	87,083	87,083	0%	178.38	136.58	-24%	15,620,983	11,883,782	-3,737,201	-24%	
		Car 3	124,330	124,330	0%	61.94	71.52	16%	7,683,891	8,891,671	1,207,780	16%	
		Car 4	442,185	442,185	0%	43.94	43.68	0%	19,384,914	19,376,439	-8,475	0%	
		Car 5	66,057	66,057	0%	18.58	43.68	135%	1,227,381	2,085,636	1,658,255	135%	
	Car 6	1	1	0%	25.06	43.68	65%	17	20	3	15%		
	Gasoline total	794,688	794,688	0%	92.69	81.65	-12%	73,165,851	64,851,551	-8,314,300	-11%		
	Diesel Oil	pre-Cars	1,711	1,711	0%	318.16	264.95	-17%	511,883	453,197	-58,686	-11%	
		Car 1	8,426	8,426	0%	297.32	245.85	-17%	2,585,115	2,239,987	-345,128	-13%	
Car 2		42,514	42,514	0%	407.93	279.27	-31%	17,384,549	13,921,916	-3,462,633	-20%		
Car 3		121,429	121,429	0%	555.36	170.55	-69%	67,437,053	21,681,366	-45,755,687	-69%		
1.A.3.a.ii. Heavy Duty Vehicles (HDVs)	Gasoline	Car 4	264,943	264,943	0%	388.88	143.48	-63%	162,917,881	39,089,755	-123,828,126	-76%	
		Car 5	113,047	113,047	0%	435.12	143.48	-67%	49,536,960	16,332,974	-33,203,986	-67%	
		Car 6	695	695	0%	259.59	143.48	-45%	180,582	99,754	-80,828	-45%	
		Diesel oil total	553,564	553,564	0%	434.12	159.92	-63%	249,713,791	80,138,959	-169,574,832	-68%	
		Pkx Total	1,348,252	1,348,252	0%	232.52	133.47	-43%	713,499,642	152,990,510	-560,509,132	-78%	
		Gasoline	pre-Cars	1,084	1,084	0%	626.25	640.95	10%	482,024	560,373	78,349	16%
	Car 1		283	283	0%	818.74	284.47	-65%	243,289	86,158	-157,131	-65%	
	Car 2		1,184	1,184	0%	268.66	191.66	-29%	310,529	223,189	-87,340	-28%	
	Car 3		783	783	0%	85.97	95.39	11%	67,320	74,782	7,462	11%	
	1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	Car 4	2,562	2,562	0%	37.38	46.51	24%	95,786	119,162	23,376	24%
Car 5			241	241	0%	16.13	46.51	189%	3,882	11,190	7,308	189%	
Car 6			0	0	0%	15.33	46.51	203%	1	2	1	203%	
Gasoline total			6,118	6,118	0%	229.35	186.57	-18%	1,483,081	1,254,776	-228,305	-15%	
Diesel Oil			pre-Cars	3,995	3,995	0%	425.99	386.79	-9%	1,698,260	1,225,652	-472,608	-28%
			Car 1	4,787	4,787	0%	398.71	276.24	-31%	1,984,260	1,030,426	-953,834	-48%
		Car 2	10,816	10,816	0%	336.90	153.18	-54%	3,644,582	2,091,063	-1,553,519	-43%	
		Car 3	28,876	28,876	0%	541.53	150.54	-72%	15,037,249	4,346,070	-10,691,179	-71%	
Diesel Oil		Car 4	60,032	60,032	0%	493.82	80.69	-84%	30,039,914	5,429,011	-24,610,903	-81%	
		Car 5	6,609	6,609	0%	449.36	80.69	-82%	3,300,190	584,364	-2,715,826	-82%	
	Car 6	0	0	0%	156.21	80.69	-49%	16	8	-8	-49%		
	LDVs total	115,967	115,967	0%	485.56	126.90	-74%	56,848,598	14,781,142	-42,067,456	-74%		
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Gasoline	LDVs Total	122,085	122,085	0%	468.92	130.51	-72%	57,247,399	19,932,808	-37,314,591	-72%	
		pre-Cars	2,620	2,620	0%	1062.63	1018.76	6%	2,896,189	2,671,331	-224,858	-8%	
		Car 1	2,250	2,250	0%	752.91	751.43	0%	1,039,187	1,036,297	-2,890	0%	
		Car 2	9,374	9,374	0%	804.17	543.36	-32%	7,827,125	5,037,699	-2,789,426	-36%	
		Car 3	14,181	14,181	0%	633.46	457.38	-29%	9,425,090	6,669,054	-2,756,036	-29%	
		Car 4	56,937	56,937	0%	448.88	351.81	-21%	2,363,338	1,685,274	-678,064	-29%	
	Diesel Oil	Car 5	13,296	13,296	0%	336.60	182.62	-46%	4,569,052	2,446,399	-2,122,653	-46%	
		Car 6	0	0	0%	0	0	0%	0	0	0	0%	
		Buses Total	47,365	47,365	0%	592.65	448.99	-24%	20,011,221	17,256,323	-2,754,898	-14%	
		HDVs Total	8,044	8,044	0%	1038.67	783.98	-24%	8,355,423	6,144,933	-2,210,490	-27%	
1.A.3.b.iii. Heavy Duty Trucks & Lorries	Gasoline	Car 1	29,277	29,277	0%	817.97	504.30	-38%	23,947,123	15,233,223	-8,713,900	-36%	
		Car 2	521	521	0%	301.25	372.69	24%	7,321,626	8,752,437	1,430,811	19%	
		Car 3	68,430	68,430	0%	305.26	150.63	-50%	22,977,784	15,960,483	-6,991,301	-30%	
		Car 4	342,175	342,175	0%	278.30	120.63	-57%	95,549,479	62,679,687	-32,869,792	-34%	
		Car 5	0	0	0%	0	0	0%	0	0	0	0%	
		Trucks Total	563,891	563,891	0%	418.38	244.97	-40%	233,493,271	138,136,342	-95,356,929	-41%	
	Diesel Oil	pre-Cars	7,389	7,389	0%	122.98	150.34	22%	965,588	1,110,176	144,588	15%	
		Car 1	4,085	4,085	0%	124.72	180.26	45%	599,299	885,547	286,248	48%	
		Car 2	3,544	3,544	0%	137.85	194.58	41%	488,552	680,633	192,081	41%	
		Car 3	3,560	3,560	0%	39.55	194.58	382%	140,563	630,634	490,071	345%	
Gasoline	Car 4	0	0	0%	0	0	0%	0	0	0	0%		
	Car 5	0	0	0%	0	0	0%	0	0	0	0%		
MDOVs Total	79,819	79,819	0%	118.79	171.64	54%	2,137,062	3,299,152	1,162,090	54%			
1.A.3.b. Road Transport	Total	2,160,883	2,160,883	0%	305.90	157.85	-48%	132,365,736	131,625,655	-740,081	0%		

Adjustment details for 2023

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions					
		current	adjusted	difference	current	adjusted	difference	current	adjusted	adjustment	difference		
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [kg]	in [%]		
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	11,581	11,581	0%	607.72	635.38	-52%	7,026,041	6,189,785	-836,256	-52%	
		Car 1	47,487	47,487	0%	348.56	281.60	-31%	16,571,746	11,426,129	-5,145,617	-31%	
		Car 2	72,781	72,781	0%	194.27	137.92	-29%	13,487,749	10,035,380	-3,452,369	-29%	
		Car 3	189,443	189,443	0%	63.89	72.62	14%	6,927,963	7,875,172	947,209	14%	
		Car 4	489,541	489,541	0%	45.39	45.13	-1%	18,541,881	18,436,736	-105,145	-1%	
		Car 5	181,961	181,961	0%	18.61	45.13	142%	1,887,355	4,681,311	2,793,956	142%	
		Car 6	282	282	0%	25.05	45.13	74%	7,339	12,735	5,396	74%	
		Gasoline total	750,957	750,957	0%	85.73	78.89	-9%	64,379,964	58,577,229	-5,802,735	-9%	
	Diesel Oil	pre-Cars	1,487	1,487	0%	311.98	284.56	-9%	463,963	383,872	-80,091	-9%	
		Car 1	6,660	6,660	0%	297.79	264.44	-11%	1,980,364	1,771,787	-208,577	-11%	
		Car 2	33,957	33,957	0%	408.82	279.27	-40%	13,887,432	7,445,646	-6,441,787	-40%	
		Car 3	183,539	183,539	0%	564.82	176.63	-69%	58,398,037	18,434,837	-39,963,200	-69%	
		Car 4	234,943	234,943	0%	398.41	146.46	-62%	91,724,190	34,488,997	-57,235,193	-62%	
		Car 5	173,112	173,112	0%	434.89	146.46	-66%	75,284,364	25,353,375	-49,930,989	-66%	
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	Car 6	1,557	1,557	0%	219.84	158.66	-44%	484,664	220,086	-264,578	-44%	
		Diesel oil total	555,245	555,245	0%	455.96	158.66	-64%	242,962,982	88,096,639	-154,866,343	-64%	
		FCs Total	1,306,202	1,306,202	0%	234.67	115.29	-50%	386,442,896	146,673,597	-239,769,298	-50%	
		pre-Cars	962	962	0%	632.38	645.95	2%	607,779	621,146	13,417	2%	
		Car 1	232	232	0%	803.24	183.22	-65%	199,985	70,295	-129,691	-65%	
		Car 2	989	989	0%	271.16	195.74	-28%	268,134	133,538	-134,596	-28%	
		Car 3	835	835	0%	89.38	98.33	10%	14,623	82,092	7,469	10%	
		Car 4	2,030	2,030	0%	38.49	47.58	24%	78,155	96,691	18,536	24%	
	Diesel Oil	Car 5	610	610	0%	16.36	47.58	182%	9,941	29,011	19,069	182%	
		Car 6	0	0	0%	15.37	47.58	210%	2	6	4	210%	
		Gasoline total	5,657	5,657	0%	218.93	183.15	-16%	1,238,546	1,092,662	-145,884	-12%	
		pre-Cars	3,281	3,281	0%	424.46	386.79	-9%	1,368,754	1,022,093	-346,661	-9%	
		Car 1	3,666	3,666	0%	398.34	276.24	-30%	1,445,980	1,017,634	-428,346	-30%	
		Car 2	8,479	8,479	0%	336.40	133.28	-49%	2,852,325	1,639,772	-1,212,553	-43%	
1.A.3.b.ii. Heavy Duty Vehicles Buses	Gasoline	Car 3	23,785	23,785	0%	558.53	150.44	-73%	13,050,281	3,565,082	-9,485,199	-73%	
		Car 4	59,485	59,485	0%	494.22	89.85	-82%	29,369,870	5,337,395	-24,032,475	-82%	
		Car 5	15,964	15,964	0%	442.70	89.85	-80%	7,040,461	1,420,906	-5,619,555	-80%	
		Car 6	1	1	0%	15.14	89.85	-61%	122	72	-50	-61%	
		Diesel oil total	114,350	114,350	0%	485.91	120.17	-75%	55,186,382	13,741,354	-41,445,028	-75%	
		LDVs Total	129,008	129,008	0%	489.51	123.61	-74%	56,344,943	14,834,656	-41,510,287	-74%	
		Diesel Oil	pre-Cars	1,326	1,326	0%	1091.46	1119.45	4%	1,410,640	1,352,283	-58,357	-4%
			Car 1	1,245	1,245	0%	727.34	731.15	1%	1,017,476	1,017,184	-292	-1%
	Car 2		7,789	7,789	0%	703.46	643.34	-9%	5,085,091	4,597,478	-487,613	-9%	
	Car 3		14,483	14,483	0%	629.94	437.61	-31%	9,073,197	6,089,794	-2,983,403	-31%	
	Car 4		5,331	5,331	0%	468.10	361.85	-23%	2,642,179	1,677,777	-964,402	-23%	
	Car 5		20,752	20,752	0%	347.84	182.99	-47%	7,219,563	3,787,467	-3,432,096	-47%	
	Car 6		73	73	0%	64.52	182.99	236%	3,961	13,295	9,334	236%	
	Buses Total		50,962	50,962	0%	533.22	384.33	-28%	27,141,913	19,965,298	-7,176,615	-28%	
1.A.3.b.iii. Heavy Duty Vehicle Trucks & Lorries	Gasoline	pre-Cars	6,922	6,922	0%	1036.95	758.82	-27%	7,107,543	5,252,345	-1,855,198	-27%	
		Car 1	3,630	3,630	0%	743.70	570.57	-24%	2,721,326	2,071,111	-650,215	-24%	
		Car 2	23,577	23,577	0%	818.27	516.43	-37%	19,262,253	12,175,855	-7,086,398	-37%	
		Car 3	96,735	96,735	0%	634.65	370.21	-42%	61,387,137	35,888,665	-25,498,472	-42%	
		Car 4	50,550	50,550	0%	356.50	288.44	-19%	19,982,680	16,880,877	-3,101,723	-19%	
		Car 5	485,981	485,981	0%	261.24	152.32	-42%	116,149,855	61,626,577	-54,523,278	-42%	
		Car 6	2,380	2,380	0%	188.487	360.323	345%	188,487	360,323	171,836	223%	
		Trucks Total	589,585	589,585	0%	385.33	224.69	-41%	224,829,180	132,064,153	-92,765,027	-41%	
	Gasoline	pre-Cars	6,780	6,780	0%	122.76	151.03	23%	822,530	1,011,520	188,991	23%	
		Car 1	4,386	4,386	0%	124.61	171.38	38%	536,615	738,050	201,435	38%	
		Car 2	3,287	3,287	0%	136.22	184.56	43%	445,087	636,853	191,766	43%	
		Car 3	3,984	3,984	0%	38.66	184.56	382%	18,386	778,616	760,230	382%	
		Car 4	0	0	0%	0	0	0%	0	0	0	0%	
		Car 5	0	0	0%	0	0	0%	0	0	0	0%	
MWVs Total	18,268	18,268	0%	107.43	173.28	61%	1,982,546	3,165,439	1,182,893	61%			
1.A.3.b. Road Transport	Total	2,084,964	2,084,964	0%	295.79	151.71	-49%	616,721,438	396,381,343	-220,340,094	-49%		

Adjustment details for 2023

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference		
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [kg]	in [kg]	in [%]		
1.A.3.a.i. Passenger Cars	Gasoline	pre-Cars	11,680	11,680	0%	618.27	649.35	-5%	7,011,641	6,967,452	-44,189	-5%
		Car 1	37,743	37,743	0%	353.78	341.68	-32%	13,362,986	9,129,436	-4,233,550	-32%
		Car 2	62,680	62,680	0%	188.93	139.33	-27%	11,889,922	8,722,244	-3,167,678	-27%
		Car 3	97,782	97,782	0%	66.38	73.19	10%	6,481,618	7,156,920	675,302	10%
		Car 4	397,911	397,911	0%	47.22	46.52	-1%	18,790,345	18,589,937	-200,407	-1%
		Car 5	138,063	138,063	0%	18.60	46.52	150%	2,583,150	6,439,691	3,856,541	150%
	Car 6	2,714	2,714	0%	25.99	46.52	79%	70,526	126,237	55,711	79%	
	Gasoline total	748,116	748,116	0%	88.35	74.85	-16%	68,190,887	56,671,737	-11,519,150	-17%	
	Diesel Oil	pre-Cars	1,389	1,389	0%	312.32	284.56	-9%	433,081	368,136	-64,945	-9%
		Car 1	5,425	5,425	0%	298.42	286.79	-4%	1,678,472	1,640,688	-37,784	-4%
		Car 2	28,437	28,437	0%	408.84	279.91	-40%	11,563,522	6,253,531	-5,309,991	-40%
		Car 3	92,795	92,795	0%	574.33	176.67	-69%	53,284,956	16,579,373	-36,705,583	-69%
Car 4		222,583	222,583	0%	393.55	149.27	-62%	87,598,471	33,225,566	-54,372,905	-62%	
Car 5		233,786	233,786	0%	435.42	149.27	-66%	101,787,275	34,884,788	-66,902,487	-66%	
Car 6	4,536	4,536	0%	259.53	149.27	-42%	1,177,151	677,045	-500,106	-42%		
Diesel oil total	589,131	589,131	0%	437.14	158.71	-64%	257,533,128	83,899,619	-173,633,509	-64%		
FCs Total	1,338,247	1,338,247	0%	237.49	111.77	-53%	317,723,135	146,571,356	-171,151,779	-53%		
1.A.3.b.i. Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	981	981	0%	633.81	645.95	2%	568,320	575,293	6,973	2%
		Car 1	194	194	0%	803.50	183.22	-65%	167,261	59,328	-107,933	-66%
		Car 2	836	836	0%	274.42	291.18	21%	229,520	188,285	-41,235	-21%
		Car 3	784	784	0%	52.66	191.79	10%	72,691	79,780	7,089	10%
		Car 4	1,089	1,089	0%	43.70	48.89	20%	77,284	82,833	5,549	20%
		Car 5	965	965	0%	16.37	48.89	183%	15,187	47,268	32,081	183%
	Car 6	1	1	0%	17.66	48.89	176%	26	72	46	176%	
	Gasoline total	5,578	5,578	0%	262.86	184.67	-30%	1,137,299	1,096,727	-40,572	-4%	
	Diesel Oil	pre-Cars	2,744	2,744	0%	424.37	386.79	-9%	1,168,757	944,928	-223,829	-9%
		Car 1	2,945	2,945	0%	398.34	276.24	-30%	1,166,782	834,566	-332,216	-30%
		Car 2	6,982	6,982	0%	336.92	133.28	-49%	2,340,147	1,350,674	-989,473	-42%
		Car 3	20,421	20,421	0%	568.12	150.38	-73%	11,437,995	3,070,913	-8,367,082	-73%
Car 4		55,087	55,087	0%	497.72	90.46	-82%	27,776,440	5,048,416	-22,728,024	-82%	
Car 5		29,024	29,024	0%	14,937	90.46	-80%	13,911,325	2,687,964	-10,823,361	-80%	
Car 6	41	41	0%	51.26	90.46	-40%	6,160	2,688	-3,472	-40%		
Diesel oil total	118,777	118,777	0%	488.66	154.93	-76%	47,083,533	13,656,488	-33,427,045	-76%		
LDVs Total	124,354	124,354	0%	484.14	184.63	-76%	16,214,142	4,937,275	-11,276,867	-76%		
1.A.3.b.ii. Heavy Duty Vehicles (HDVs)	Diesel Oil	pre-Cars	1,172	1,172	0%	1098.69	1118.23	-4%	1,249,028	1,194,143	-54,885	-4%
		Car I	1,004	1,004	0%	727.95	170.88	-76%	766,620	791,181	24,561	3%
		Car II	6,084	6,084	0%	764.37	643.48	-16%	5,326,968	4,576,271	-750,697	-14%
		Car III	13,187	13,187	0%	628.43	457.65	-27%	8,262,880	5,988,206	-2,264,675	-27%
		Car IV	4,945	4,945	0%	485.55	351.71	-27%	2,270,611	1,739,796	-530,815	-23%
		Car V	26,096	26,096	0%	388.88	183.48	-40%	8,435,683	4,420,733	-4,014,951	-40%
	Car VI	537	537	0%	44.76	183.48	319%	34,047	86,572	52,525	319%	
	Buses Total	51,776	51,776	0%	509.54	380.06	-26%	26,790,969	16,620,483	-10,170,486	-26%	
	pre-Cars	9,893	9,893	0%	1039.72	717.35	-29%	6,072,150	4,322,888	-1,749,262	-29%	
	Car I	2,985	2,985	0%	743.27	585.27	-21%	1,150,848	1,066,909	-83,939	-7%	
	Car II	16,444	16,444	0%	918.17	610.47	-34%	10,989,081	9,440,953	-1,548,128	-14%	
	Car III	78,750	78,750	0%	823.53	587.53	-29%	47,837,440	27,587,440	-20,250,000	-29%	
Car IV	42,781	42,781	0%	396.90	287.27	-27%	16,936,987	12,989,770	-3,947,217	-23%		
Car V	436,960	436,960	0%	261.70	152.65	-40%	193,161,304	66,786,496	-126,374,807	-40%		
Car VI	18,020	18,020	0%	58.67	152.65	261%	913,082	2,750,630	1,837,548	261%		
Trucks Total	1,887,739	1,887,739	0%	353.86	287.20	-21%	211,087,531	124,188,949	-86,898,582	-41%		
1.A.3.b.iii. Heavy Duty Trucks & Lorries	Diesel Oil	pre-Cars	6,362	6,362	0%	123.07	117.19	-23%	181,736	164,179	-17,557	-10%
		Car I	4,013	4,013	0%	102.03	173.15	30%	562,073	694,880	132,807	30%
		Car 2	3,362	3,362	0%	132.24	195.58	40%	435,668	645,804	209,136	40%
		Car 3	4,562	4,562	0%	39.81	195.58	391%	181,610	882,175	700,565	391%
		Car 4	0	0	0%	0	0	0%	0	0	0	0%
		Car 5	0	0	0%	0	0	0%	0	0	0	0%
	MWVs Total	18,029	18,029	0%	104.34	175.38	68%	5,962,088	5,187,618	-774,470	-13%	
	1.A.3.b. Road Transport	2,132,683	2,132,683	0%	288.88	145.76	-50%	616,079,063	390,854,371	-225,224,692	-37%	

NER Code	Fuel	Activity Data			Implied Emission Factor			MO ₂ Emissions				
		current in [t]	adjusted in [t]	difference in [%]	current in [kg/t]	adjusted in [kg/t]	difference in [%]	current in [kg]	adjusted in [kg]	difference in [%]		
1.A.3.b.1 - Passenger Car	Gasoline	pre-Euro	116,607	116,607	0%	812.37	844.11	-11%	7,132,580	6,337,484	-796,044	-11%
		Euro 1	30,667	30,667	0%	364.77	263.93	-30%	11,062,246	7,480,541	-3,521,705	-30%
		Euro 2	53,486	53,486	0%	196.58	140.31	-29%	10,514,477	7,584,432	-3,816,844	-32%
		Euro 3	87,374	87,374	0%	68.31	75.83	7%	6,965,585	6,459,377	-424,218	7%
		Euro 4	387,139	387,139	0%	45.16	47.80	-3%	13,093,585	10,536,009	-2,527,557	-3%
		Euro 5	171,250	171,250	0%	18.50	47.80	157%	3,183,252	8,187,581	-5,004,289	157%
	Gasoline total	10,321,416	10,321,416	0%	257.87	257.87	0%	50,757,683	43,317,224	-7,440,459	-15%	
	Gasoline total	752,526	752,526	0%	70.30	73.69	-4%	52,725,533	56,986,591	-2,261,612	-4%	
	Diesel Oil	pre-Euro	1,341	1,341	0%	311.73	264.96	-16%	217,967	356,266	-42,722	-16%
		Euro 1	4,982	4,982	0%	298.92	267.29	-11%	1,482,284	1,387,663	-165,115	-11%
Euro 2		23,934	23,934	0%	406.71	220.45	-46%	9,734,484	5,276,400	-4,458,884	-46%	
Euro 3		82,749	82,749	0%	585.53	178.81	-69%	48,481,830	14,796,245	-33,655,585	-69%	
Euro 4		211,237	211,237	0%	207.27	151.77	-42%	83,917,068	32,059,973	-51,857,706	-42%	
Euro 5		285,011	285,011	0%	436.38	151.77	-65%	124,721,396	43,730,380	-81,434,896	-65%	
Gasoline total	65,081	65,081	0%	253.24	151.77	-39%	4,175,580	2,480,686	-1,729,814	-39%		
Gasoline total	626,045	626,045	0%	220.85	180.12	-23%	32,024,068	30,643,081	-1,380,987	-4%		
Gasoline total	1,338,571	1,338,571	0%	218.44	191.15	-12%	33,881,074	35,643,913	-1,762,787	-5%		
1.A.3.b.2 - Light Duty Vehicles (LDV)	Gasoline	pre-Euro	996	996	0%	634.74	646.95	2%	589,683	675,724	18,644	3%
		Euro 1	173	173	0%	886.21	389.96	-54%	150,074	53,575	-96,499	-64%
		Euro 2	748	748	0%	264.73	287.11	27%	212,880	154,839	-58,029	-27%
		Euro 3	177	177	0%	56.62	185.21	7%	75,952	81,070	5,878	7%
		Euro 4	1,067	1,067	0%	43.47	50.15	15%	81,129	83,610	12,475	15%
		Euro 5	1,374	1,374	0%	17.51	50.15	183%	23,517	30,636	6,461	183%
	Gasoline total	5,815	5,815	0%	18.06	50.15	179%	312	807	495	179%	
	Gasoline total	5,845	5,845	0%	426.34	176.49	-47%	5,112,544	1,031,652	-4,080,892	-47%	
	Diesel Oil	pre-Euro	2,517	2,517	0%	426.76	378.73	-11%	1,064,675	287,719	-776,956	-27%
		Euro 1	2,588	2,588	0%	393.62	279.25	-29%	987,136	559,649	-427,428	-43%
Euro 2		6,087	6,087	0%	338.61	183.25	-42%	3,985,985	1,180,889	-425,126	-42%	
Euro 3		18,220	18,220	0%	511.75	150.58	-74%	11,471,076	2,742,565	-7,675,828	-74%	
Euro 4		52,361	52,361	0%	499.70	91.89	-42%	26,164,486	4,780,746	-21,394,740	-42%	
Euro 5		45,749	45,749	0%	436.44	91.89	-79%	29,486,234	4,250,620	-16,237,709	-79%	
Gasoline total	128,526	128,526	0%	475.56	170.96	-77%	65,146,525	16,287,231	-48,859,338	-77%		
Gasoline total	134,443	134,443	0%	463.16	133.81	-71%	62,208,160	19,298,649	-42,966,311	-71%		
1.A.3.b.3 - Heavy Duty Vehicle Buses	Diesel Oil											

MFR Code	Fuel	Activity Data				Applied Emission Factor				NO _x Emissions			
		current	adjusted	difference	in [%]	current	adjusted	difference	in [%]	current	adjusted	adjustment	difference in [%]
1.A.3.a.i. Passenger Cars	Gasoline	pre-Euro	11,380	11,380	0%	833.23	844.11	-10%	7,206.152	6,191.562	-1,014.590	-14%	
		Euro 1	34,112	34,112	0%	371.34	245.71	-34%	8,963.881	6,924.572	-3,029.229	-34%	
		Euro 2	42,925	42,925	0%	207.78	142.09	-32%	8,919.795	6,099.059	-2,818.646	-32%	
		Euro 3	72,871	72,871	0%	73.86	74.74	1%	5,381.351	5,440.237	58.887	1%	
		Euro 4	353,474	353,474	0%	52.36	49.62	-6%	18,485.037	17,326.221	-1,158.816	-6%	
		Euro 5	180,783	180,783	0%	19.11	49.62	157%	3,454.481	8,881.456	5,426.975	157%	
	Diesel Oil	Euro 6	22,612	22,612	0%	35.76	42.83	84%	750.781	1,413.133	662.352	84%	
		LtN Total	715,156	715,156	0%	74.38	71.73	-4%	53,138.187	51,380.946	-1,458.802	-4%	
		pre-Euro	1,282	1,282	0%	318.32	264.56	-16%	387.517	320.733	-66.784	-16%	
		Euro 1	4,219	4,219	0%	298.14	264.56	-10%	1,261.930	1,129.989	-132.021	-10%	
		Euro 2	19,689	19,689	0%	407.90	220.36	-46%	8,013.587	4,339.719	-3,674.786	-46%	
		Euro 3	71,044	71,044	0%	595.91	179.04	-70%	42,271.648	12,719.962	-29,551.686	-70%	
		Euro 4	182,410	182,410	0%	401.42	154.07	-62%	77,227.055	29,644.450	-47,593.206	-62%	
		Euro 5	364,346	364,346	0%	434.62	154.07	-65%	132,290.493	46,890.424	-85,400.069	-65%	
Light Duty Vehicles (LDV)	Euro 6	52,676	52,676	0%	253.76	154.07	-41%	13,637.082	8,180.354	-5,456.728	-41%		
	Diesel oil total	645,535	645,535	0%	406.19	159.88	-61%	275,136.233	183,161.591	-91,964.732	-61%		
	LtN Total	5,360,121	5,360,121	0%	74.38	71.73	-4%	328,347.000	314,444.444	-13,892.556	-4%		
	pre-Euro	979	979	0%	954.31	685.39	-28%	575.300	547.977	-27.324	-5%		
	Euro 1	1,850	1,850	0%	895.63	311.93	-65%	134.523	48.851	-85.672	-65%		
	Euro 2	629	629	0%	298.27	212.94	-29%	187.533	133.879	-53.654	-29%		
	Euro 3	781	781	0%	905.50	188.62	-79%	73.989	76.155	2.166	3%		
	Euro 4	1,720	1,720	0%	47.96	51.30	9%	89.958	80.248	-9.710	-9%		
1.A.3.a.ii. Heavy Duty Vehicle Buses	Gasoline	Euro 5	1,620	1,620	0%	18.61	51.30	179%	29.812	83.086	53.274	179%	
		Euro 6	84	84	0%	18.71	51.30	176%	1.752	4.884	3.132	176%	
		Gasoline total	5,793	5,793	0%	987.52	172.88	-82%	1,083.507	1,086.998	3.490	0%	
		pre-Euro	2,323	2,323	0%	474.91	386.79	-19%	598.185	772.571	253.454	29%	
		Euro 1	2,196	2,196	0%	391.47	495.45	26%	824.237	453.227	-371.010	-45%	
		Euro 2	5,025	5,025	0%	334.81	183.29	-45%	1,622.296	971.296	-650.920	-40%	
	Diesel Oil	Euro 3	15,781	15,781	0%	580.35	150.67	-74%	9,112.414	2,385.713	-6,726.701	-74%	
		Euro 4	47,480	47,480	0%	501.73	91.74	-82%	23,782.396	4,340.298	-19,442.098	-82%	
		Euro 5	62,116	62,116	0%	436.13	91.74	-79%	27,090.214	5,680.295	-21,392.809	-79%	
		Euro 6	635	635	0%	154.91	91.74	-40%	87.768	60.230	-27.528	-40%	
		Diesel oil total	135,356	135,356	0%	868.35	187.96	-77%	63,565.443	16,687.890	-46,877.553	-77%	
		LtN Total	141,098	141,098	0%	492.78	170.62	-76%	64,589.370</				

Adjustment details for 2026

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions					
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference			
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [%]			
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	11,782	11,782	0%	634.75	644.11	-14%	7,470,914	6,410,967	-1,067,967	-14%	
		Car 1	20,270	20,270	0%	372.25	281.68	-35%	7,545,483	4,988,888	-2,646,596	-35%	
		Car 2	36,062	36,062	0%	212.73	143.11	-33%	7,671,581	5,180,897	-2,516,693	-33%	
		Car 3	83,039	83,039	0%	76.17	75.50	-1%	4,881,482	4,759,259	-42,233	-1%	
		Car 4	334,413	334,413	0%	53.74	50.17	-7%	17,969,964	16,777,445	-1,192,489	-7%	
		Car 5	183,374	183,374	0%	19.09	50.17	163%	3,580,746	9,189,834	5,609,088	163%	
		Car 6	66,332	66,332	0%	26.67	50.17	88%	1,768,917	3,327,850	1,558,933	88%	
		Gasoline total	715,272	715,272	0%	78.93	70.65	-10%	58,736,967	50,535,049	-8,201,918	-14%	
	Diesel Oil	pre-Cars	1,280	1,280	0%	308.76	264.56	-14%	386,262	339,173	-46,089	-12%	
		Car 1	3,749	3,749	0%	1,122.49	1,011.626	-10%	1,122,449	1,011,626	-111,425	-10%	
		Car 2	16,584	16,584	0%	407.19	221.43	-46%	6,720,132	3,663,964	-3,056,168	-46%	
		Car 3	81,398	81,398	0%	802.50	179.24	-78%	36,991,999	11,085,409	-25,906,590	-70%	
		Car 4	175,940	175,940	0%	405.76	156.24	-61%	71,362,220	27,474,086	-43,878,214	-61%	
		Car 5	299,654	299,654	0%	433.34	156.24	-64%	130,032,044	46,019,229	-83,912,815	-64%	
1.A.3.b.i - Heavy Duty Vehicles - Trucks & Lorries	Gasoline	pre-Cars	116,084	116,084	0%	268.75	156.24	-42%	30,427,555	10,232,785	-19,194,770	-63%	
		Diesel oil total	625,119	625,119	0%	418.36	160.76	-61%	277,947,660	188,535,230	-89,408,430	-61%	
		Pkx Total	1,386,391	1,386,391	0%	235.75	154.41	-35%	327,778,627	199,070,280	-128,708,347	-39%	
		Diesel Oil	pre-Cars	910	910	0%	602.79	645.95	-7%	593,186	587,543	-5,643	-1%
			Car 1	136	136	0%	908.31	312.78	-66%	122,126	42,425	-79,700	-66%
			Car 2	540	540	0%	308.39	217.84	-30%	162,311	117,797	-44,514	-28%
			Car 3	650	650	0%	108.43	111.57	3%	70,432	72,731	2,299	3%
			Car 4	1,684	1,684	0%	43.06	52.36	21%	78,714	84,003	5,289	7%
	Car 5		1,724	1,724	0%	19.82	52.36	164%	34,157	80,258	46,100	164%	
	1.A.3.b.ii - Heavy Duty Vehicles - Buses	Diesel Oil	Gasoline total	5,506	5,506	0%	588.27	171.66	-7%	1,068,292	1,013,478	-54,814	-5%
			pre-Cars	2,189	2,189	0%	414.81	386.79	-7%	899,849	885,433	-14,416	-2%
			Car 1	1,780	1,780	0%	391.89	276.25	-30%	780,189	385,371	-394,798	-50%
			Car 2	4,223	4,223	0%	323.43	153.31	-53%	1,365,994	676,452	-689,542	-50%
			Car 3	13,582	13,582	0%	588.91	150.77	-74%	8,064,323	2,940,233	-5,124,090	-74%
Car 4			43,141	43,141	0%	504.48	32.40	-93%	21,783,989	3,986,141	-17,777,788	-82%	
Car 5			74,231	74,231	0%	434.16	32.40	-93%	32,223,283	6,658,780	-25,564,503	-79%	
Car 6			4,921	4,921	0%	113.49	32.40	-71%	755,285	454,676	-300,609	-40%	
Diesel oil total		148,068	148,068	0%	456.12	185.62	-77%	65,712,732	15,256,007	-50,456,726	-77%		
100% Total		149,994	149,994	0%	445.23	188.29	-76%	66,781,025	16,229,684	-50,551,340	-76%		
Diesel Oil		pre-Cars	891	891	0%	1076.81	1919.23	-43%	964,197	988,234	24,037	2%	
		Car 1	583	583	0%	731.36	1732.57	-58%	433,675	446,236	12,560	3%	
		Car 2	4,375	4,375	0%	708.25	645.03	-9%	3,440,614	2,822,621	-617,993	-18%	
		Car 3	10,333	10,333	0%	632.87	458.91	-28%	6,539,364	4,741,827	-1,797,536	-27%	
	Car 4	4,449	4,449	0%	475.90	382.29	-20%	2,117,219	1,666,881	-450,338	-21%		
	Car 5	34,380	34,380	0%	366.36	185.22	-49%	8,935,974	4,517,517	-4,418,457	-49%		
	Car 6	9,126	9,126	0%	62.79	185.22	196%	573,066	1,680,431	1,107,365	196%		
	Buses Total	54,157	54,157	0%	404.73	388.24	-4%	23,082,189	16,885,117	-6,197,072	-27%		
Diesel Oil	pre-Cars	3,933	3,933	0%	1034.81	737.35	-29%	4,087,249	2,980,379	-1,106,870	-29%		
	Car 1	1,555	1,555	0%	748.16	587.92	-21%	1,163,482	789,813	-373,669	-32%		
	Car 2	8,876	8,876	0%	817.75	585.42	-28%	7,258,047	4,486,626	-2,771,421	-38%		
	Car 3	34,167	34,167	0%	638.91	568.06	-11%	21,553,280	12,251,155	-9,302,125	-43%		
	Car 4	34,287	34,287	0%	396.94	281.86	-29%	9,640,364	6,885,621	-2,754,743	-29%		
	Car 5	269,736	269,736	0%	267.22	153.60	-42%	74,680,233	39,976,610	-34,623,623	-46%		
	Car 6	261,480	261,480	0%	61.77	153.60	149%	16,149,280	40,204,036	24,054,756	149%		
	Trucks Total	594,013	594,013	0%	226.31	180.97	-20%	134,431,899	101,486,262	-32,945,637	-24%		
Gasoline	pre-Cars	5,543	5,543	0%	125.59	155.78	24%	696,072	883,289	187,218	24%		
	Car 1	3,360	3,360	0%	127.11	177.29	39%	427,113	585,796	158,683	39%		
	Car 2	3,375	3,375	0%	125.94	187.68	50%	421,961	687,078	265,117	63%		
	Car 3	6,443	6,443	0%	48.36	187.68	281%	209,627	1,273,671	1,064,044	508%		
	Car 4	66	66	0%	17.47	187.68	1031%	1,134	12,632	11,498	1031%		
	Gasoline Total	16,185	16,185	0%	96.14	181.68	89%	1,885,897	3,452,476	1,566,579	83%		
1.A.3.b.iii - Motorized Two-Wheelers (MOWs)		0	0	0%	0	0	0%	0	0	0%			
1.A.3.b.iii - Road Transport	Total	2,267,339	2,267,339	0%	258.89	137.22	-46%	553,799,598	362,981,620	-190,817,978	-46%		

Adjustment details for 2027

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions				
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference		
1.A.3.a.i - Passenger Cars	Gasoline	pre-Cars	12,282	12,282	0%	636.73	644.11	-14%	7,914,267	6,680,187	-1,126,108	-14%
		Car 1	17,449	17,449	0%	372.96	241.68	-35%	6,588,311	4,217,644	-2,391,267	-36%
		Car 2	30,435	30,435	0%	217.43	141.75	-35%	6,617,570	4,374,140	-2,243,430	-34%
		Car 3	54,271	54,271	0%	78.48	76.27	-3%	4,254,938	4,139,376	-115,562	-3%
		Car 4	315,086	315,086	0%	54.96	51.26	-7%	17,316,320	16,151,881	-1,164,439	-7%
		Car 5	180,240	180,240	0%	19.17	51.26	167%	3,485,382	9,239,815	5,754,433	167%
		Car 6	114,791	114,791	0%	26.66	51.26	92%	3,063,235	5,884,372	2,821,136	92%
		Gasoline total	724,571	724,571	0%	87.66	80.88	-8%	49,046,874	38,534,734	-10,512,140	-21%
	Diesel Oil	pre-Cars	1,780	1,780	0%	368.76	254.56	-31%	486,963	347,626	-139,337	-29%
		Car 1	3,749	3,749	0%	298.37	271.67	-9%	1,082,288	910,182	-172,106	-16%
		Car 2	13,788	13,788	0%	407.17	222.43	-45%	5,614,130	3,066,393	-2,547,736	-45%
		Car 3	52,128	52,128	0%	808.95	179.65	-78%	31,696,478	9,364,788	-22,331,690	-70%
		Car 4	187,947	187,947	0%	418.16	158.34	-61%	64,733,485	24,983,323	-39,750,162	-61%
		Car 5	283,480	283,480	0%	423.99	158.34	-63%	120,187,695	44,873,190	-75,314,505	-63%
		Car 6	184,768	184,768	0%	262.61	158.34	-40%	48,521,163	29,255,985	-19,265,178	-40%
Diesel oil total	696,582	696,582	0%	398.65	161.95	-59%	272,126,081	112,890,717	-159,235,364	-58%		
Pkx Total	1,421,152	1,421,152	0%	225.98	155.61	-31%	321,152,965	163,425,451	-157,727,514	-49%		
Gasoline	pre-Cars	940	940	0%	611.41	645.95	-7%	612,247	598,978	-13,269	-2%	
	Car 1	124	124	0%	908.23	312.78	-66%	112,083	39,682	-72,401	-65%	
	Car 2	485	485	0%	302.12	221.62	-27%	140,344	102,950	-37,394	-27%	
	Car 3	596	596	0%	118.57	115.36	4%	65,955	68,812	2,857	4%	
	Car 4	1,476	1,476	0%	50.72	53.38	5%	74,877	78,816	3,938	5%	
	Car 5	1,680	1,680	0%	21.73	53.38	146%	36,240	89,034	52,794	146%	
	Car 6	910	910	0%	19.18	53.38	180%	17,052	49,080	31,928	180%	
	Gasoline total	6,186	6,186	0%	171.55	167.18	-2%	1,058,799	1,034,211	-24,588	-2%	
Diesel Oil	pre-Cars	2,087	2,087	0%	413.41	386.79	-7%	860,499	831,163	-29,336	-3%	
	Car 1	1,538	1,538	0%	398.47	276.25	-30%	680,795	331,158	-349,636	-50%	
	Car 2	3,580	3,580	0%	321.26	153.04	-52%	1,143,793	687,293	-456,500	-40%	
	Car 3	11,684	11,684	0%	556.30	150.79	-73%	6,940,879	1,758,747	-5,182,132	-75%	
	Car 4	39,050	39,050	0%	556.30	83.09	-84%	19,749,647	6,325,035	-13,424,612	-68%	
Car 5	75,789	75,789	0%	432.66	83.09	-79%	32,770,966	7,054,945	-25,736,011	-79%		
Car 6	19,625	19,625	0%	101.71	83.09	-19%	2,977,439	1,806,875	-1,180,564	-40%		
Diesel Oil total	153,284	153,284	0%	424.66	183.89	-57%	65,083,930	15,925,296	-49,168,714	-76%		
LDVx Total	199,470	199,470	0%	414.83	186.35	-54%	66,152,129	16,969,427	-49,193,302	-76%		
Bees	pre-Cars	736	736	0%	707.33	191.23	-73%	790,293	750,425	-39,834	-5%	
	Car 1	411	411	0%	721.97	352.57	-51%	380,684	389,062	8,458	2%	
	Car 2	3,325	3,325	0%	797.91	362.49	-54%	2,820,887	2,147,480	-673,606	-24%	
	Car 3	8,878	8,878	0%	621.33	459.12	-26%	4,478,440	3,948,747	-529,693	-12%	
	Car 4	3,823	3,823	0%	474.97	345.79	-27%	1,952,380	1,347,630	-604,750	-31%	
	Car 5	21,913	21,913	0%	363.90	185.64	-49%	7,937,974	4,063,646	-3,884,291	-49%	
Car 6	16,686	16,686	0%	68.52	185.64	270%	86,215	272,590	186,375	216%		
Bees total	53,382	53,382	0%	318.80	280.71	-12%	19,793,981	15,384,828	-4,409,877	-22%		
Heavy Duty Vehicles & Trucks & Lorries	pre-Cars	3,686	3,686	0%	1034.40	713.35	-30%	3,730,272	2,659,676	-1,071,256	-29%	
	Car 1	1,311	1,311	0%	748.03	468.38	-37%	980,942	614,151	-366,808	-37%	
	Car 2	7,087	7,087	0%	817.66	583.45	-29%	5,748,836	3,580,026	-2,168,810	-38%	
	Car 3	26,886	26,886	0%	838.17	350.72	-54%	15,942,611	9,583,881	-6,358,729	-40%	
	Car 4	90,082	90,082	0%	797.77	276.34	-30%	7,666,416	4,679,166	-2,987,250	-39%	
	Car 5	396,065	396,065	0%	366.16	154.35	-58%	19,280,799	11,536,367	-7,744,432	-40%	
Car 6	396,065	396,065	0%	66.82	154.35	131%	31,985,366	41,798,611	9,813,245	31%		
Trucks Total	598,263	598,263	0%	595.82	179.92	-96%	116,611,141	105,268,508	-11,342,633	-10%		
Motorized Two-Wheelers (M2W)	pre-Cars	5,336	5,336	0%	125.91	157.19	25%	671,885	830,789	168,903	25%	
	Car 1	3,257	3,257	0%	126.39	177.86	41%	411,617	579,244	167,627	41%	
	Car 2	3,396	3,396	0%	122.55	180.33	48%	415,280	673,548	258,267	62%	
	Car 3	6,741	6,741	0%	40.22	180.33	349%	271,187	1,336,956	1,065,848	393%	
	Car 4	430	430	0%	19.29	180.33	983%	7,862	86,270	77,408	983%	
Car 5	0	0	0%	0.00	0.00	0%	0	0	0	0%		
M2Wx Total	19,160	19,160	0%	92.83	183.39	96%	5,788,674	5,653,187	-134,487	-2%		
1.A.3.b. Road Transport		2,291,437	2,291,437	0%	233.43	135.23	-42%	525,549,490	384,486,958	-141,072,424	-27%	

Adjustment details for 2018

NFR Code	Fuel	Activity Data			Implied Emission Factor			NO _x Emissions					
		current	adjusted	difference	current	adjusted	difference	current	adjusted	difference			
		in [t]	in [t]	in [%]	in [g/t]	in [g/t]	in [%]	in [t]	in [t]	in [%]			
1.A.3.b.i - Passenger Cars	Gasoline	pre-Cars	12,219	12,219	0%	637.58	644.11	-6%	7,780,965	6,648,721	-1,132,234	-15%	
		Car 1	14,362	14,362	0%	374.34	341.68	-9%	5,371,161	3,448,643	-1,922,518	-36%	
		Car 2	34,285	34,285	0%	221.97	111.68	-50%	5,360,977	2,688,163	-2,672,814	-50%	
		Car 3	43,642	43,642	0%	88.16	76.96	-13%	3,487,781	3,358,617	-129,164	-4%	
		Car 4	278,738	278,738	0%	55.98	52.30	-7%	15,683,488	14,576,755	-1,106,733	-7%	
		Car 5	186,030	186,030	0%	19.35	52.30	-170%	3,228,282	8,725,668	5,497,386	170%	
	Diesel Oil	pre-Cars	159,041	159,041	0%	6.00	52.30	-88%	4,190,432	6,718,250	2,527,818	60%	
		Car 1	2,949	2,949	0%	303.16	254.96	-16%	386,246	365,173	-21,073	-5%	
		Car 2	10,784	10,784	0%	298.17	222.67	-25%	862,432	675,165	-187,267	-22%	
		Car 3	40,786	40,786	0%	612.49	180.15	-71%	24,932,029	7,333,241	-17,598,788	-71%	
		Car 4	130,534	130,534	0%	414.71	180.40	-56%	54,133,837	20,937,329	-33,196,508	-61%	
		Car 5	251,212	251,212	0%	416.25	180.40	-56%	104,585,786	40,253,731	-64,332,055	-61%	
	Trucks & Lorries	pre-Cars	228,685	228,685	0%	254.87	180.40	-30%	58,284,140	35,680,446	-22,603,700	-39%	
		Diesel oil total	666,074	666,074	0%	375.66	163.38	-56%	247,596,063	188,748,684	-158,847,459	-56%	
	100% Total		1,365,181	1,365,181	0%	214.34	154.68	-28%	262,589,060	156,555,421	-106,033,639	-40%	
1.A.3.b.ii - Light Duty Vehicles (LDVs)	Gasoline	pre-Cars	911	911	0%	604.51	645.95	-7%	596,851	582,662	-14,189	-2%	
		Car 1	188	188	0%	911.58	312.78	-66%	98,528	33,895	-64,633	-66%	
		Car 2	377	377	0%	303.64	224.45	-26%	114,682	84,713	-29,969	-26%	
		Car 3	511	511	0%	111.92	116.84	5%	57,282	60,739	3,457	6%	
		Car 4	1,275	1,275	0%	52.02	54.36	4%	65,290	69,278	3,988	6%	
		Car 5	1,483	1,483	0%	23.70	54.36	129%	35,160	80,626	45,466	129%	
	Diesel Oil	pre-Cars	1,643	1,643	0%	19.18	54.36	182%	39,550	89,326	49,776	182%	
		Car 1	6,315	6,315	0%	154.22	160.11	4%	999,199	1,011,138	11,939	1%	
		Car 2	1,872	1,872	0%	411.51	386.79	-6%	771,337	574,742	-196,595	-26%	
		Car 3	1,285	1,285	0%	389.94	276.25	-29%	483,129	272,296	-210,833	-44%	
		Car 4	2,942	2,942	0%	318.56	153.88	-51%	965,389	550,789	-414,600	-43%	
		Car 5	9,363	9,363	0%	558.10	150.74	-73%	5,689,152	1,411,297	-4,277,855	-75%	
	Trucks & Lorries	pre-Cars	66,283	66,283	0%	432.92	93.81	-78%	28,684,080	6,217,660	-22,466,420	-78%	
		Diesel oil total	154,259	154,259	0%	384.71	182.69	-53%	59,344,525	35,880,316	-23,464,209	-39%	
	100% Total		160,574	160,574	0%	375.86	184.94	-51%	69,343,125	36,851,449	-32,491,676	-47%	
1.A.3.b.iii - Heavy Duty Vehicles (HDVs)	Gasoline	pre-Cars	547	547	0%	1078.15	1919.23	-45%	589,357	557,147	-32,210	-5%	
		Car 1	237	237	0%	732.67	752.57	3%	173,676	176,368	2,692	2%	
		Car 2	2,270	2,270	0%	787.83	646.33	-18%	1,780,686	1,487,437	-293,249	-16%	
		Car 3	6,757	6,757	0%	638.89	459.32	-29%	4,262,734	3,183,482	-1,079,252	-25%	
		Car 4	3,043	3,043	0%	473.16	382.73	-19%	1,439,790	1,073,333	-366,457	-26%	
		Car 5	18,189	18,189	0%	362.42	186.37	-49%	6,663,265	3,376,016	-3,287,249	-49%	
	Diesel Oil	pre-Cars	20,670	20,670	0%	64.89	186.37	288%	1,176,026	3,662,314	2,486,288	212%	
		Car 1	91,634	91,634	0%	309.75	283.53	-8%	15,993,526	13,687,186	-2,306,340	-15%	
		Car 2	3,262	3,262	0%	1034.82	737.35	-29%	3,375,359	2,485,071	-890,288	-26%	
		Car 3	1,094	1,094	0%	747.82	488.39	-35%	918,052	512,378	-405,674	-44%	
		Car 4	5,544	5,544	0%	817.44	581.68	-29%	4,532,190	2,781,510	-1,750,680	-39%	
		Car 5	20,583	20,583	0%	629.54	363.68	-42%	12,967,751	7,277,249	-5,690,502	-44%	
	Trucks & Lorries	pre-Cars	15,912	15,912	0%	358.89	276.23	-23%	6,334,421	4,386,424	-1,947,997	-31%	
		Diesel oil total	154,963	154,963	0%	250.40	154.68	-38%	45,964,143	24,283,389	-21,680,754	-47%	
	100% Total		381,799	381,799	0%	68.78	154.68	125%	28,251,482	69,665,886	41,414,404	146%	
1.A.3.b.iv - Motorised Two-Wheelers (MTWs)	Gasoline	pre-Cars	4,940	4,940	0%	128.95	188.61	46%	622,656	783,451	160,795	26%	
		Car 1	2,966	2,966	0%	128.14	177.79	41%	374,114	527,294	153,180	41%	
		Car 2	3,221	3,221	0%	128.33	188.64	46%	387,596	639,833	252,237	65%	
		Car 3	6,241	6,241	0%	48.24	188.64	384%	251,126	1,239,686	988,560	394%	
		Car 4	1,130	1,130	0%	58.41	188.64	324%	23,966	224,682	200,716	840%	
		Car 5	0	0	0%	0.00	0.00	0%	0	0	0	0%	
	Diesel Oil	pre-Cars	18,487	18,487	0%	85.66	188.61	198%	1,658,558	3,454,767	1,796,209	108%	
		Car 1	2,180,983	2,180,983	0%	215.85	133.49	-38%	478,758,286	291,129,612	-187,628,674	-39%	
		Car 2	18,487	18,487	0%	85.66	188.61	198%	1,658,558	3,454,767	1,796,209	108%	
		Car 3	6,241	6,241	0%	48.24	188.64	288%	251,126	1,239,686	988,560	394%	
		Car 4	1,130	1,130	0%	58.41	188.64	324%	23,966	224,682	200,716	840%	
		Car 5	0	0	0%	0.00	0.00	0%	0	0	0	0%	
	100% Total		18,487	18,487	0%	85.66	188.61	198%	1,658,558	3,454,767	1,796,209	108%	
	1.A.3.b.v - Road Transport	Gasoline	pre-Cars	12,219	12,219	0%	637.58	644.11	-6%	7,780,965	6,648,721	-1,132,234	-15%
			Car 1	14,362	14,362	0%	374.34	341.68	-9%	5,371,161	3,448,643	-1,922,518	-36%
Car 2			34,285	34,285	0%	221.97	111.68	-50%	5,360,977	2,688,163	-2,672,814	-50%	
Car 3			43,642	43,642	0%	88.16	76.96	-13%	3,487,781	3,358,617	-129,164	-4%	
Car 4			278,738	278,738	0%	55.98	52.30	-7%	15,683,488	14,576,755	-1,106,733	-7%	
Car 5			186,030	186,030	0%	19.35	52.30	-170%	3,228,282	8,725,668	5,497,386	170%	
Diesel Oil		pre-Cars	159,041	159,041	0%	6.00	52.30	-88%	4,190,432	6,718,250	2,527,818	60%	
		Car 1	2,949	2,949	0%	303.16	254.96	-16%	386,246	365,173	-21,073	-5%	
		Car 2	10,784	10,784	0%	298.17	222.67	-25%	862,432	675,165	-187,267	-22%	
		Car 3	40,786	40,786	0%	612.49	180.15	-71%	24,932,029	7,333,241	-17,598,788	-71%	
		Car 4	130,534	130,534	0%	414.71	180.40	-56%	54,133,837	20,937,329	-33,196,508	-61%	
		Car 5	251,212	251,212	0%	416.25	180.40	-56%	104,585,786	40,253,731	-64,332,055	-61%	
Trucks & Lorries		pre-Cars	228,685	228,685	0%	254.87	180.40	-30%	58,284,140	35,680,446	-22,603,700	-39%	
		Diesel oil total	666,074	666,074	0%	375.66	163.38	-56%	247,596,063	188,748,684	-158,847,459	-56%	
100% Total		1,365,181	1,365,181	0%	214.34	154.68	-28%	262,589,060	156,555,421	-106,033,639	-40%		

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Adjustment 2014 (accepted)	-105.6	-101.3	-95.7	-91.7						
Adjustment 2015 (accepted)	-100.3	-95.5	-89.9	-85.1						
Adjustment 2016 (accepted)	-151.3	-146.9	-145.1	-142.5	-128.1					
Adjustment 2017 (accepted)	-151.3	-146.8	-145.0	-142.4	-127.2	-100.9				
Adjustment 2018 (accepted)	-172.3	-174.5	-177.4	-180.4	-171.5	-148.9	-123.2			
Adjustment 2019 (accepted)	-172.3	-174.5	-177.4	-180.3	-171.4	-148.8	-123.3	93.7		
Adjustment 2020 (accepted)	-297.8	-302.3	-301.3	-306.1	-294.5	-269.0	-244.3	-214.9	-174.6	
Adjustment 2021 (proposal)	-296.1	-300.7	-300.4	-305.2	-294.9	-274.9	-250.9	-221.1	-179.6	-144.8
Change against Adjustment 2020	1.7	1.6	0.9	0.9	-0.4	-5.9	-6.6	-6.2	-5.0	

The noticeable differences between the 2017 and 2018 adjustment proposals resulted from an ad-hoc revision of the *Handbook Emission Factors for Road Transport* (HBEFA, version 3.3) in the aftermath of the so-called “Diesel-gate”.⁸⁾

The even bigger changes between adjustment 2019 and adjustment proposal 2020 result from an additional rather fundamental revision of the *Handbook Emission Factors for Road Transport* now available in version 4.1⁹⁾ strongly effecting the TREMOD model underlying Germany's emission reporting for road transport and hence any adjustments of NO_x emissions. With such major model revision between submissions 2019 and 2020, the 2020 adjustment proposal differed significantly from the adjustment applied for and accepted in 2019. ** In comparison to 2020, the TREMOD model applied for the 2021 submission has been revised only slightly in terms of NO_x emission factors. Hence, the 2021 adjustment proposal differs only slightly from the (accepted) proposal provided with submission 2020.**

Adjustment description as provided in IIRs 2014 and 2015:

[image Description%20Adjustment%20DE-A%20-%20NOx%20from%201.A.3.b%20Road%20transport%20-%20IIRs%202014%20%26%202015.pdf](#)

10) 11) 12) 13) 14) ([KNOERR2020a> Knörr et al. (2019a): Knörr, W., Heidt, C., Gores, S., & Bergk, F.: ifeu Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung Heidelberg gGmbH, ifeu): Fortschreibung des Daten- und Rechenmodells: Energieverbrauch und Schadstoffemissionen des motorisierten Verkehrs in Deutschland 1960-2035, sowie TREMOD, im Auftrag des Umweltbundesamtes, Heidelberg & Berlin, 2020.)) : 7 : UBA, 2018: CLRTAP submission 2018, Dessau, 2018 : 8 : ECE/EB.AIR/113/Add.1, 2012: Report of the Executive Body on its thirty-first session, Decision 2012/12 on Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them; URL: http://www.unece.org/fileadmin/DAM/env/documents/2012/EB/ECE_EB.AIR_113_Add.1_ENG_1_.pdf : 9 : CEIP, 2014a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment RR/2014/GERMANY: Review of the 2014 Adjustment Application by Germany, URL: https://webdab01.umweltbundesamt.at/download/adjustments2014/Adjustment_Review_Report_GERMANY_2014.pdf?cgiproxy_skip=1, 5 August 2014 : 10 : CEIP, 2014b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2014/10: Review of adjustment applications 2014; URL: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2015/ece.eb.air.ge.1.2014.10.edited.ae_formatting_accepted.ko.pdf, 5 August 2014 : 11 : CEIP, 2015a: Centre on Emission Inventories and Projections (CEIP): CEIP/Adjustment RR/2015/Germany: Review of the 2015 Adjustment Application by Germany, URL: https://webdab01.umweltbundesamt.at/download/adjustments2015/Germany2015-adj.pdf?cgiproxy_skip=1, September 2015 : 12 : CEIP, 2015b: Centre on Emission Inventories and Projections (CEIP): CE/EB.AIR/GE.1/2015/10-ECE/EB.AIR/WG.1/2015/13: Review of adjustment applications 2015; URL: http://www.ceip.at/fileadmin/inhalte/emep/Adjustments/ece.eb.air.ge.1.2015.10_ece.eb.air.wg.1.2015.13.AV.pdf, 6 July 2015 : 13 : CEIP, 2016a: Centre on Emission Inventories and Projections (CEIP): Review of the 2016 Adjustment Application by Germany, URL: https://webdab01.umweltbundesamt.at/download/adjustments2016/Germany2016-adj.pdf?cgiproxy_skip=1, 2016 : 14 : CEIP, 2016b: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2016/10-ECE/EB.AIR/WG.1/2016/18: Review of adjustment applications 2016; URL: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2016/ECE_EB.AIR_GE.1_2016_10_E.pdf, 2016 : 15 : CEIP, 2017a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2017/10-ECE/EB.AIR/WG.1/2017/20: Review of adjustment applications 2017; URL: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2017/Advance_ece_eb_air_ge_1_2017_10_ece_eb_air_wg_1_2017.pdf, 2017 : 16 : CEIP, 2018a: Centre on Emission Inventories and Projections (CEIP): ECE/EB.AIR/GE.1/2018/10-ECE/EB.AIR/WG.1/2018/21: Review of adjustment applications 2018; URL: https://www.ceip.at/fileadmin/inhalte/emep/pdf/2018/ADJ_ece.eb.air.ge.1.2018.10-ece.eb.air.wg.1.2018.21_advance.pdf, 2018 : 17 : CEIP, 2019a: Centre on Emission Inventories and Projections (CEIP):

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